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10/815,061	03/31/2004	Surajit Chaudhuri	301552.01	7927

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ART UNIT	**PAPER NUMBER**
2166	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/815,061	CHAUDHURI ET AL.	
	Examiner	Art Unit	
	Emeka Ebirim	2166	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-93* is/are pending in the application.

4a) Of the above claim(s) *28-93* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *28-93* are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *03/07/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Status

1. The application has been examined. Claims 28-93 have been restricted. Claims 1-27 are rejected as detailed below and are pending in this office action.

Election/Restrictions

2. Restriction to one of the following inventions is required under 35 U.S.C. 121:

Group I. Claims 1-27 drawn to subject matter directed to object-oriented data structure and its maintenance in memory, classified in class 707, subclass 103R.

Group II. Claims 28-93 drawn to methods of access augmentation or optimizing, classified in class 707, subclass 2.

The inventions are distinct, each from the other because of the following reasons: inventions group I and group II are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct from each other if they are shown to be separately usable. In the instant case, invention group I has separate utility such as an object-oriented data structure and its maintenance in memory. See MPEP § 806.05(d).

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

Because these inventions are distinct for the reasons given above and the

search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

Because these inventions are independent or distinct for the reasons given above and the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

During a telephone conversation with Spellman Steven (Reg #45124) on 10/10/2006 a provisional election was made without traverse to prosecute the invention of Group I. Applicant in replying to this Office action must make affirmation of this election. Claims 28-93 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(I).

Information Disclosure Statement

3. The information disclosure statement filed 03/07/2005 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document;

each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

Specification

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

(a) Title of the Invention: See 37 CFR 1.72(a) and MPEP § 606. The title of the invention should be placed at the top of the first page of the specification unless the title is provided in an application data sheet. The title of the invention should be brief but technically accurate and descriptive, preferably from two to seven words may not contain more than 500 characters.

Claim Objections

5. Claim 1 is objected to because of the following informalities:

Claim 1 lines 4 recites "the plurality". This recitation does not clearly point out the intended subject matter. Examiner assumes that "the plurality" used in line 4 is referring to "a plurality of database objects" as recited in line 1. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Lines 4-5 recite, "master database object in the plurality dominates an associated slave database object". Lines 7-8 "slave database objects that do not dominate their associated master database object". These two recitations appears to be conflicting because, it is unclear how the slave objects would be expected to dominate the master object.

Claim Rejections - 35 USC § 101

8. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

9. Claim 1-27 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

With respect to claims 1-8, the claims appear to be a program, e.g., "a database operator". Without a computer readable medium, the program as recited in claims 1-8 are nonstatutory in view of MPEP 2106 (IV)(B)(1)(a)[1]. Additionally, the claims do not

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[1] MPEP 2106 (IV)(B)(1)(a):
Similarly, computer programs claimed as computer listings *per se*, i.e., the descriptions or expressions of the programs, are not physical "things." They are neither computer components nor statutory processes, as they are not "acts" being performed. Such claimed computer programs do not define any structural and functional interrelationships between the computer program and other claimed elements of a computer which permit the computer program's functionality to be realized. In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. Accordingly, it is important to distinguish claims that define descriptive material *per se* from claims that define statutory inventions.

recite a practical application by producing a physical transformation or producing a useful, and tangible results in view of MPEP 2106 (IV)(B)(2)(b)[2] and 2106 (IV)(B)(2)(b)(ii)[3]. To perform a physical transformation, the claimed invention must transform an article of physical object into a different state or thing. Transformation of data is not a physical transformation. A useful, concrete, and tangible results must be either specifically recited in the claim or flow inherently therefrom. To be useful the claimed invention must establish a specific, substantial, and credible utility. To be tangible the claimed invention must produce a practical application or real world result.

With respect to claims 9-27, the method, program and system as recited do not produce a useful and tangible result in view of MPEP 2106 (IV)(B)(2)(b) and 2106

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[2] MPEP 2106 (IV)(B)(2)(b):

A claim that requires one or more acts to be performed defines a process. However, not all processes are statutory under 35 U.S.C. 101. *Schrader*, 22 F.3d at 296, 30 USPQ2d at 1460. To be statutory, a claimed computer-related process must either: (A) result in a physical transformation outside the computer for which a practical application in the technological arts is either disclosed in the specification or would have been known to a skilled artisan (discussed in i) below), or (B) be limited to a practical application within the technological arts (discussed in ii) below). See *Diamond v. Diehr*, 450 U.S. at 183-84, 209 USPQ at 6 (quoting *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1877)) ("A [statutory] process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing.... The process requires that certain things should be done with certain substances, and in a certain order; but the tools to be used in doing this may be of secondary consequence."). See also *Alappat*, 33 F.3d at 1543, 31 USPQ2d at 1556-57 (quoting *Diamond v. Diehr*, 450 U.S. at 192, 209 USPQ at 10). See also *id.* at 1569, 31 USPQ2d at 1578-79 (Newman, J., concurring) ("unpatentability of the principle does not defeat patentability of its practical applications") (citing *O 'Reilly v. Morse*, 56 U.S. (15 How.) at 114-19). If a physical transformation occurs outside the computer, a disclosure that permits a skilled artisan to practice the claimed invention, i.e., to put it to a practical use, is sufficient. On the other hand, it is necessary for the claimed invention taken as a whole to produce a practical application if there is only a transformation of signals or data inside a computer or if a process merely manipulates concepts or converts one set of numbers into another.

A claimed process is clearly statutory if it results in a physical transformation outside the computer, i.e., falls into one or both of the following specific categories ("safe harbors").

[3] 2106 (IV)(B)(2)(b)(ii):

For such subject matter to be statutory, the claimed process must be limited to a practical application of the abstract idea or mathematical algorithm in the technological arts. See *Alappat*, 33 F.3d at 1543, 31 USPQ2d at 1556-57 (quoting *Diamond v. Diehr*, 450 U.S. at 192, 209 USPQ at 10). See also *Alappat* 33 F.3d at 1569, 31 USPQ2d at 1578-79 (Newman, J., concurring) ("unpatentability of the principle does not defeat patentability of its practical applications") (citing *O 'Reilly v. Morse*, 56 U.S. (15 How.) at 114-19). A claim is limited to a practical application when the method, as claimed, produces a concrete, tangible and useful result; i.e., the method recites a step or act of producing something that is concrete, tangible and useful. See *AT&T*, 172 F.3d at 1358, 50 USPQ2d at 1452. Likewise, a machine claim is statutory when the machine, as claimed, produces a concrete, tangible and useful result (as in *State Street*, 149 F.3d at 1373, 47 USPQ2d at 1601) and/or when a specific machine is being claimed (as in *Alappat*, 33 F.3d at 1544, 31 USPQ2d at 1557 (*=> *en=< banc*). For example, a computer process that simply calculates a mathematical algorithm that models noise is nonstatutory. However, a claimed process for digitally filtering noise employing the mathematical algorithm is statutory.

(IV)(B)(2)(b)(ii). To perform a physical transformation, the claimed invention must transform an article of physical object into a different state or thing. Transformation of data is not a physical transformation. A useful, and tangible results must be either specifically recited in the claim or flow inherently therefrom. To be useful the claimed invention must establish a specific, substantial, and credible utility. To be tangible the claimed invention must produce a practical application or real world result.

With respect to claims 23-27, instead of identifying the apparatus in view of its hardware or hardware and software combination in view of MPEP 2106 (IV)(B)(2)(a)[4], the apparatus of claims 23-27 directs to software per se.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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[4] MPEP 2106 (IV)(B)(2)(a):

Products may be either machines, manufactures, or compositions of matter.

A *machine* is "a concrete thing, consisting of parts or of certain devices and combinations of devices." *Burr v. Duryee*, 68 U.S. (1 Wall.) 531, 570 (1863).

...

If a claim defines a useful machine or manufacture by identifying the physical structure of the machine or manufacture in terms of its hardware or hardware and software combination, it defines a statutory product. See, e.g., *Lowry*, 32 F.3d at 1583, 32 USPQ2d at 1034-35; *Warmerdam*, 33 F.3d at 1361-62, 31 USPQ2d at 1760. Office personnel must treat each claim as a whole. The mere fact that a hardware element is recited in a claim does not necessarily limit the claim to a specific machine or manufacture. Cf. *In re Iwahashi*, 888 F.2d 1370, 1374-75, 12 USPQ2d 1908, 1911-12 (Fed. Cir. 1989), cited with approval in *Alappat*, 33 F.3d at 1544 n.24, 31 USPQ2d at 1558 n.24.

11. Claims 1-7, 9-12, 14-21 and 23-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Patent No: 6,223,171 to Chaudhuri et al (hereinafter Chaudhuri).

Claim 1.

Chaudhuri discloses:

A database operator that selects a subset of a plurality of database objects having associated attributes comprising [Col 6 lines 6-10]:

a partial order specification module that inputs a partial order criterion for an attribute whereby a master database object in the plurality dominates an associated slave database object (objects are ordered and ranked, summarized) [Col 17 lines 24-26, Col 16 lines 41-45, Col 18 lines 40-50, Fig 9]; and

a database object subset selection module that applies the partial order criterion to the database object attributes and eliminates all slave database objects that do not dominate their associated master database object from the subset [Col 17 lines 24-26, Col 16 lines 41-45].

Claim 2.

Chaudhuri discloses the elements of claim 1 as above and furthermore it discloses a partitioning module that partitions the database objects into partitions based on a partitioning attribute [See Chaudhuri Col 18 lines 34-50, Fig 9]; wherein database objects in the partition have equivalent values for the partitioning attribute and wherein

the subset selection module applies the partial order separately for each partition [See Chaudhuri Col 18 lines 34-50, Fig 9].

Claim 3.

Chaudhuri discloses the elements of claim 1 as above and furthermore it discloses a dominance aggregation module that, for a master database object, aggregates information about slave database objects that the master database object dominates [Col 17 lines 58-67].

Claim 4.

Chaudhuri discloses the elements of claim 3 as above and furthermore it discloses information about a slave database object is distributed between two master database objects that dominate the slave object [Col 18 lines 34-50, Col 22 lines 20-25].

Claim 5.

Chaudhuri discloses the elements of claim 1 as above and furthermore it discloses wherein the database objects are database statements from a database workload presented according to a workload schema [Col 16 lines 53-57].

Claim 6.

Chaudhuri discloses the elements of claim 1 as above and furthermore it discloses wherein when a slave database object dominates the associated master

database object, one of either the slave or master database objects is eliminated from the subset [Col 17 lines 24-26, Col 16 lines 41-45, Fig 9].

Claim 7.

Chaudhuri discloses the elements of claim 1 as above and furthermore it discloses wherein the partial order criterion comprises a conjunction of one or more transitive inequality conditions [Col 20 lines 22-26].

Claim 9.

Chaudhuri discloses:

A method that selects a subset of database objects from a plurality of database objects having associated attributes comprising [Col 6 lines 6-10]:

accessing two or more database objects from the plurality [one or more objects, Col 16 lines 52-55];

inputting a partial order criterion for at least one attribute by which a master database object dominates a slave database object (objects are ordered and ranked, summarized) [Col 17 lines 24-26, Col 16 lines 41-45, Col 18 lines 40-50, Fig 9];

applying the partial order criteria to the two or more database objects [Col 17 lines 24-26, Col 16 lines 41-45, Col 18 lines 40-50, Fig 9]; and

including any master database objects that are not dominated by any other database object to the subset [Col 17 lines 24-26, Col 16 lines 41-45, Col 18 lines 40-50, Fig 9].

Claim 10.

Chaudhuri discloses the elements of claim 9 s above and furthermore it discloses partitioning the plurality of database objects into partitions based on a partitioning attribute such that database objects in the partition have equivalent values for the partitioning attribute and wherein the partial order criteria is applied separately to database objects in each partition [See Chaudhuri Col 18 lines 34-50, Fig 9]

Claim 11.

Chaudhuri discloses the elements of claim 9 as above and furthermore it discloses aggregating information about slave database objects that are dominated by an associated master database object and are not included in the subset [Col 17 lines 24-26, Col 16 lines 41-45].

Claim 12.

Chaudhuri discloses the elements of claim 9 as above and furthermore it discloses selecting one of two database objects for inclusion in the subset if each of the two database objects dominates the other [Col 18 lines 39-45].

Claim 14.

Chaudhuri discloses one or more computer-readable media comprising computer executable instructions for performing the method of claim 9 [Col 8 lines 4-11].

Claim 15.

Chaudhuri discloses:

One or more computer readable media having computer-executable instructions stored thereon for selecting a subset of a plurality of database objects having associated attributes, the instructions comprising:

inputting a partial order criterion for an attribute whereby a master database object in the plurality dominates an associated slave database object (objects are ordered and ranked, summarized) [Col 17 lines 24-26, Col 16 lines 41-45, Col 18 lines 40-50, Fig 9]; and

applying the partial order criterion to the database object attributes [Col 17 lines 24-26, Col 16 lines 41-45, Col 18 lines 40-50, Fig 9]; and

eliminating all slave database objects that do not dominate their associated master database object from the subset [Col 17 lines 24-26, Col 16 lines 41-45].

Claim 16.

Chaudhuri discloses the elements of claim 15 as above and furthermore it discloses wherein the instructions comprise partitioning the database objects into partitions based on a partitioning attribute; wherein database objects in the partition have equivalent values for the partitioning attribute and wherein the filtering module applies the partial order separately for each partition [See Chaudhuri Col 18 lines 34-50, Fig 9].

Claim 17.

Chaudhuri discloses the elements of claim 15 as above and furthermore it discloses wherein the instructions comprise aggregating information about slave database objects that the master database object dominates [Col 17 lines 58-67].

Claim 18.

Chaudhuri discloses the elements of claim 17 as above and furthermore it discloses wherein the information about a slave database object is distributed between two master database objects that dominate the slave object [Col 18 lines 34-50, Col 22 lines 20-25].

Claim 19.

Chaudhuri discloses the elements of claim 15 as above and furthermore it discloses wherein the database objects are database statements from a database workload presented according to a workload schema [Col 16 lines 53-57].

Claim 20.

Chaudhuri discloses the elements of claim 15 as above and furthermore it discloses wherein when a slave database object dominates the associated master database object, one of either the slave or master database objects is eliminated from the subset [Col 17 lines 24-26, Col 16 lines 41-45, Fig 9].

Claim 21.

Chaudhuri discloses the elements of claim 15 as above and furthermore it discloses wherein the partial order criterion comprises a conjunction of one or more transitive inequality conditions [Col 20 lines 22-26].

12. Subject matter of claims 23-26 are rejected in the analysis above in claims 1-7, 9-12 and 14-21 and these claims are rejected on that basis.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. Claims 8,13,22 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chaudhuri in view of Patent No: 6,598,038 to Guay et al (hereinafter Guay).

Claim 8.

Chaudhuri discloses the elements to claim 2 as above but it does not explicitly indicate "hashes database objects". Guay discloses the claimed limitation [Guay Col 2 lines 37-40]. It would have been obvious to one of ordinary skill in the art to have

combined the cited references because hashing database objects as disclosed by Guay would have enabled Chaudhuri to implement a workload reduction mechanism for index tuning by providing a system that includes a database workload source which provides input to a workload filter [Col 2 lines 30-35]

Furthermore it would serve workload filter to select relevant database query statements that are representative. [Col 2 lines 30-40].

Claim 13.

Chaudhuri discloses the elements of claim 10 as above but it does not explicitly indicate "hashing the database objects" Guay discloses the claimed limitation [Guay Col 2 lines 37-40]. It would have been obvious to one of ordinary skill in the art to have combined the cited references because hashing database objects as disclosed by Guay would have enabled Chaudhuri to implement a workload reduction mechanism for index tuning by providing a system that includes a database workload source which provides input to a workload filter [Col 2 lines 30-35]

Furthermore it would serve workload filter to select relevant database query statements that are representative. [Col 2 lines 30-40].

Claim 22.

Chaudhuri discloses the elements of claim 16 as above but it does not explicitly indicate "hashing the database objects" Guay discloses the claimed limitation [Guay Col 2 lines 37-40]. It would have been obvious to one of ordinary skill in the art to have

combined the cited references because hashing database objects as disclosed by Guay would have enabled Chaudhuri to implement a workload reduction mechanism for index tuning by providing a system that includes a database workload source which provides input to a workload filter [Col 2 lines 30-35]

Furthermore it would serve workload filter to select relevant database query statements that are representative. [Col 2 lines 30-40].

15. Subject matter of claims 27 is rejected in the analysis above in claims 8,13 and 22 and these claims are rejected on that basis.

16. Examiner's Note: Examiner has cited particular columns and line numbers in the references as applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings in the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant, in preparing the responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the examiner.

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See the accompanying PTO-892 form.

Contact Information

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emeka Ebirim whose telephone number is 571-272-3994. The examiner can normally be reached on 8:30pm - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hosain Alam can be reached on 571-272-3978. The fax phone number for the organization where this application or proceeding is assigned is 571-272-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Name: Emeka Ebirim
Art Unit: 2166

HOSAIN ALAM
SUPERVISORY PATENT EXAMINER